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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
OLSEN, KAJ K	

ART UNIT	PAPER NUMBER
1753	

DATE MAILED: 05/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/313,184	MIWA ET AL.	
	Examiner	Art Unit	
	Kaj K. Olsen	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 February 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *22,24,30,32-37 and 1620* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *36 and 37* is/are allowed.

6)☒ Claim(s) *22,24 and 30-35* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *6-14-05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 16, 22, 24 and 30 are rejected under 35 U.S.C. 102(b) as being anticipated by EP 0 810 430 A2 (hereafter "EP '430"). EP '430 is being cited and relied on for the first time with this office action. Its use here was necessitated by applicant's removal of "two fold" or "2:1" in claims 16 and 30.

3. With respect to claim 16, EP '810 discloses a sensor element comprising negative and positive electrodes (78a, 78b) disposed on the same side of a solid electrolyte substrate 75-4 and a circuit for applying an electric potential between the negative electrode and the positive electrode. See fig. 38-40 and p. 31, l. 17 through p. 32, l. 33. Fig. 39 and 40 also show that the electrode areas differ in size with electrode 78a being larger than electrode 78b while col. 11, ll. 17-23 and p. 17, ll. 23-34 teach that the electrodes should comprise porous platinum.

4. With respect to claim 22, see p. 17, ll. 14-19.

5. With respect to claim 24, that is only the intended use of the apparatus and the intended use need not be given further due consideration in determining patentability. However, it is noted that the electrodes 78a and 78b are being operated in the limit-current regime because Ip2 cannot be correlated to concentration unless the electrodes are operated with a limiting current.

6. With respect to claim 30 (those limitations not covered above), EP '810 also discloses the use of a gas diffusion limiting means 73 for limiting the gas diffusing into the negative electrode 78a. Furthermore, the measure of current across electrodes 78a and 78b is a measure of the concentration of NOx in the gas. See "Summary of the Disclosure" on pp. 2 and 3.

Claim Rejections - 35 USC § 103

7. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

8. Claims 16-20, 22, 24, 30, 32-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kato (USP 5,672,811) (hereafter "Kato '811") in view of Makino et al (USP 5,676,811).

9. Kato '811 discloses a sensor element comprising negative and positive electrodes (28, 24) disposed on the same side of a solid electrolyte substrate 4c and a circuit for applying an electric potential between said negative and positive electrode. See fig. 2 and col. 12, ll. 10-33. With respect to the new limitations requiring the electrodes to be constructed of porous platinum, see col. 12, ll. 14-16 and col. 18, l. 66 through col. 22. Kato '811 also shows a profile of the electrodes that appears to show that electrodes 22 and 24 differ in size, including by at least 2:1. However, because Kato does not show how far each of these electrodes extends into their respective gas chambers (i.e. their widths in the vertical direction of fig. 1), an explicit determination that the electrodes of Kato differ in size cannot be made. However, having the electrodes of a gas sensor extend over the entire width range of a given chamber was known in the art. In particular, Makino demonstrates this. See, as an example, fig. 2 where pump

electrode 8 and reference electrode 13 are shown to extend over the entire width of their respective chambers. There are a number of reasons one possessing ordinary skill in the art would have been motivated to do so. One, making the electrodes extends provides the maximum surface area for the electrode, thereby reducing any effective resistance, increasing the magnitude of the diffusion control. In addition, large electrodes (i.e. electrodes that extend the entire width of their chamber) also allow more sample to be analyzed per unit time. In addition, electrodes that span the entire chamber width would prevent any localization of NOx concentration. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Makino for the sensor of Kato '811 in order to utilize any of the set forth advantages given above.

10. With respect to claim 17 (those limitations not covered above), the set forth element resistances would have been inherent because the sizes shown by the combined teachings of Kato '811 and Makino.

11. With respect to claims 18-20 (those limitations not covered above), the particular voltages applied or their polarities is only the intended use of the apparatus and the intended use need not be given further due consideration in determining patentability. However, see Kato '811, col. 13, l. 65 through 14, l. 5 or col. 24, ll. 41 and 42 for examples of the use of either voltage range and Kato '811 does show a negatively polarized electrode 28 with a 2:1 area ratio in comparison with electrode 24.

12. With respect to claim 22, see Kato '811 col. 11, ll. 16-20.

13. With respect to claim 24, a flat-limit current sensor is only the intended use of the apparatus and the intended use need not be given further due consideration in determining

patentability. However, Kato '811 is flat and teaches the monitoring of a limiting current (col. 12, ll. 54-61.

14. With respect to claim 30 (those limitations not covered above), elements 12, 14 or 44 would read on the defined gas diffusion limiting means. In addition, current between electrodes 28 and 24 is a measure of the amount of NOx in the atmosphere. See fig. 10 as an example.

15. With respect to claim 32 (those limitations not covered above), Kato '811 comprises first and second chambers (12 and 14 respectively) formed between first and second ion conductive cell substrates (4a and 4c respectively) where first and second electrodes (28 and 24 respectively) are on the same plane as substrate 4c with electrode 28 being formed on the inside of the second chamber and the second electrode 24 being formed outside of the second chamber. See fig. 2 and the cited passages above. With respect to the sensor being an oxygen sensor, that is only the intended use of the apparatus and the intended use need not be given further due consideration in determining patentability.

16. With respect to claims 34 and 35, see the discussion for claim 32 above. In addition, the sensing of humidity and NOx is also the intended use of the device. However, Kato '811 teaches the use of this sensor configuration for both NOx sensing (col. 13, l. 65 through 14, l. 5) and humidity sensing (col. 24, ll. 32- 42).

17. Claims 16-20, 22, 24, 30 and 32-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 10-38845 (hereafter "JP '845") in view of Kato '811 and Makino. For this rejection over JP '845, the examiner will rely on citations from the English language text of USP 6,036,841 for the support for this rejection.

18. Like Kato '811 above, JP '845 discloses a NOx sensor with negative and positive electrodes (11 and 14) and a circuit for applying an electric potential between the negative and positive electrodes where the electrodes are shown in profile as differing in area, including by at least 2:1. See fig. 1 and 2 and col. 6, ll. 32-41. However, because JP '845 does not show how far each of these electrodes extends into their respective gas chambers (i.e. their widths in the vertical direction of fig. 1), an explicit determination that the electrodes of JP '845 differ in size cannot be made. However, having the electrodes of a gas sensor extend over the entire width range of a given chamber was known in the art. In particular, Makino demonstrates this. See, as an example, fig. 2 where pump electrode 8 and reference electrode 13 are shown to extend over the entire width of their respective chambers. There are a number of reasons one possessing ordinary skill in the art would have been motivated to do so. One, making the electrodes extends provides the maximum surface area for the electrode, thereby reducing any effective resistance, increasing the magnitude of the diffusion control. In addition, large electrodes (i.e. electrodes that extend the entire width of their chamber) also allow more sample to be analyzed per unit time. In addition, electrodes that span the entire chamber width would prevent any localization of NOx concentration. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Makino for the sensor of JP '845 in order to utilize any of the set forth advantages given above.

19. JP '845 also did not particularly set forth the use of porous platinum for both of these electrodes. However, the previously relied on Kato '811 (commonly owned with overlapping inventorship to JP '845) established that both the measuring 28 and reference 24 electrodes of its NOx sensor (equivalent to electrodes 14 and 11 respectively of JP '845). See Kato '811, col. 12,

ll. 14-16 and col. 18, l. 66 through col. 22. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Kato '811 for the electrodes of JP '845 because the use of already effective electrode compositions for a similarly constructed NOx requires only routine skill in the art.

20. With respect to claim 17 (those limitations not covered above), the set forth element resistances would have been inherent because the sizes shown by the combined teachings of JP '845, Kato '811 and Makino.

21. With respect to claims 18-20 (those limitations not covered above), the particular voltages applied or their polarities is only the intended use of the apparatus and the intended use need not be given further due consideration in determining patentability. However, Kato '811 already established the necessary voltages for constructing both a NOx and humidity sensor. See col. 13, l. 65 through 14, l. 5 or col. 24, ll. 41 and 42.

22. With respect to claim 22, see JP '845, col. 5, ll. 27-30.

23. With respect to claim 24, a flat-limit current sensor is only the intended use of the apparatus and the intended use need not be given further due consideration in determining patentability. However, the sensor of JP '845 is flat and is presumably for the monitoring of a limiting current. See Kato '811, which makes that explicit.

24. With respect to claim 30 (those limitations not covered above), any of elements 1, 8 or 57 would read on the defined gas diffusion limiting means. In addition, current between electrodes 14 and 11 is a measure of the amount of NOx in the atmosphere. See col. 5, ll. 41-53.

25. With respect to claim 32 (those limitations not covered above), JP '845 comprises first and second chambers (2 and 9 respectively) formed between first and second ion conductive cell

substrates (3 and 19 respectively) where first and second electrodes (14 and 11 respectively) are on the same plane as substrate 19 with electrode 14 being formed on the inside of the second chamber and the second electrode 11 being formed outside of the second chamber. See fig. 1 and 2 and the cited passages above. With respect to the sensor being a oxygen sensor, that is only the intended use of the apparatus and the intended use need not be given further due consideration in determining patentability.

26. With respect to claims 34 and 35, see the discussion for claim 32 above. In addition, the sensing of humidity and NOx is also the intended use of the device. However, JP '845 teaches the use of this sensor configuration for NOx sensing (see above) while Kato '811 renders obvious the measurement of humidity utilizing a similar electrode configuration (see rejection above). It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize this further teaching of Kato '811 for JP '845 so as to further extend the utility of the sensor to other relevant constituents in exhaust gas.

Allowable Subject Matter

27. Claims 36 and 37 are allowed.

Response to Arguments

28. Applicant's arguments filed 2-17-2006 have been fully considered but they are not persuasive.

29. Applicant's argument concerning the porous platinum limitations is unpersuasive in view of the explicitly cited use of porous platinum by Kato '811 (see the rejection above). Applicant

urges that electrodes 24 and 28 are being made of different materials (i.e. compositions). This is correct, but that conclusion doesn't read free of the amended claims. In particular, although Kato '811 utilizes different compositions for electrodes 24 and 28, both electrodes comprise platinum and thereby meet the amended claim. Applicant further urges that Kato '811 teaches the use of electrodes that are the same size. It is unclear how applicant came to that conclusion as the figures relied on by the examiner clearly show different sized electrodes in profile. Applicant did not follow up on this particular comment so it is unclear what applicant is particularly referring to.

30. Applicant traverses the examiner's rejection of claims 32-35 on three grounds. First, applicant urges that Kato '811 does not teach anything regarding the relative areas of the positive and negative electrodes. However, Kato's figures are part of the disclosure and the figures show that electrode 28 can be twice as wide in profile as electrode 24. MPEP 2125 clearly establishes that drawings can be considered as prior art. It is unnecessary for Kato '811 to establish why, as an example, electrode 28 is larger than electrode 24. If it teaches (or in this case renders obvious in further view of Makino) the claimed invention, it teaches the invention irrespective of any reason for doing so. Second, applicant urges that drawings are not to scale and it is improper to rely on them for actual proportions. However, the issue of scale largely concerns the use of drawings to infer a literal scale of elements of the figures. In fact, the decision cited in footnote 2 on p. 15 relied mainly on the determination from *In re Wright*, 193 USPQ 332, which was concerned with the use of drawings to infer "quantitative values" (i.e. whether a particular element of a drawing was ½ to 1 inch in length when the specification suggested no scale). However, the examiner is relying on a comparison of relative sizes of two analogous elements

(i.e. the relative size of two electrodes with respect to each other) to teach the broadly claimed relative sizes of the two electrodes. Third, applicant argues that Kato '811 does not disclose any electrode widths. However, that was the purpose the teaching of Makino. Applicant further urges that Makino cannot be utilized when Makino doesn't teach anything about negative or positive electrodes having an area differing by at least two-fold. The examiner is confused by this argument. First, Kato '811 already showed in profile that electrode 28 was larger than electrode 24. Second, Makino does show that electrodes can differ vastly in size (see fig. 2). In fact, Makino appears to reinforce what Kato '811 is already showing, namely that pumping electrodes in the measurement space (e.g. electrodes 7 and 8) should or could be larger than electrodes utilized for a reference cell or electrodes in the reference gas space (electrodes 12 and 13). This dovetails perfectly with what Kato '811 fig. 2 is showing in profile. Namely, Kato '811 shows the pumping electrodes (electrodes 16, 18 and 28) larger than either of the reference cell electrodes (electrodes 22 and 24), just like what Makino is showing in the exploded fig. 2.

31. Applicant further argues USP 5,403,452 to Hielscher et al teaches us that electrodes shown in profile can actually have much different widths when shown from the top down. First, the examiner finds this argument from the applicant surprising considering the applicant attempted to convince the examiner on p. 15 of the arguments that drawings cannot teach us anything about scale. Now on p. 16 of the same arguments, a figure from Hielscher is being utilized by the applicant as evidence about the relative size of elements in drawings. This is inconsistent. If drawings can't teach us relative scale (p. 15 arguments), then the drawing of fig. 4 of Hielscher cannot evidence us anything about the relative scale of Kato '811. (p. 16 arguments). Second, this evidence from Hielscher would appear to be a red herring as the

examiner has not relied on Hielscher, but rather Makino. Applicant is correct that the profile of electrodes does not teach us anything about the width of the actual electrodes. Hence, the applicant is correct that Kato '811 *could have had* different widths for electrodes 24 and 28. However, that was the reason this examiner switched to the 103 rejection of Kato '811 in view of Makino over the previous examiner's reliance on Kato '811 as an anticipatory teaching. Namely, Makino shows that it is conventional in the art to have electrodes extend the entire width of the various gas chambers. It is entirely unclear why the examiner should be persuaded by Hielscher that it would not have been obvious to utilize the same widths as taught by Makino. Makino is much more similar to Kato '811 than Kato '811 is to Hielscher. Kato '811 and Makino teach enclosing the various inner electrodes in a series of identically wide reference chambers (compare fig. 1 of Kato '811 with fig. 2 of Makino). Hielscher teaches placing only one of the electrodes in an enclosed chamber. If anything, Hielscher works against the applicant because the electrode that Hielscher teaches making small (i.e. less wide) is a reference electrode while the large wider electrodes are both pump electrodes. Again, this harkens back to Makino and Kato '811 showing that pump electrodes are large and reference cell electrodes can be smaller.

32. Applicant's also recycles the marked up fig. 1 and 2 of Kato '811 from earlier arguments against the previous examiner's rejection. However effective this might have been against the previous 102 rejection, this argument doesn't address anything about the current 103 rejection in view of Makino.

33. Applicant continues to argue that Makino fails to teach a number of the claimed elements. All of which may be true, but is irrelevant. Makino is utilized solely to teach that it is

obvious to extend an electrode across the entire width of the various gas chambers being utilized. Kato '811 already suggested the other elements of the claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kaj Olsen whose telephone number is (571) 272-1344. The examiner can normally be reached on Monday through Thursday from 5:30 A.M. to 3:00 P.M. and on alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen, can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AU 1753
May 3, 2006

KAJ K. OLSEN
PRIMARY EXAMINER